

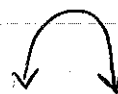
Notes 12/19 - Transformations of Quadratics

$$y = ax^2 + bx + c \rightarrow \text{standard form}$$

$$y = a(x-h)^2 + k \rightarrow \text{vertex form}$$

a

→ If negative → reflect over x-axis
(opens down, concave down)



ignore
negative

negative = sad = frowny

→ If $|a| > 1$, the parabola is skinnier
2, -5

→ If $|a| < 1$, the parabola is wider
1/2, -2/3

c or k

outside (-)

→ shifts the graph up (+) or down (-)

h

inside (-)

→ shifts the graph left and right

$$y = (x-2)^2$$

↳ shifts right
 $h = 2$

$$y = (x+2)^2$$

↳ shifts left
 $h = -2$

■ The vertex of $y = a(x-\underline{h})^2 + \underline{k}$ is (h, k)

Ex: the vertex of $y = (x+3)^2 - 4$ is $(-3, -4)$

vertex of $y = 5(x-7)^2 + 2$ is $(7, 2)$

1) Describe the transformations of $y = x^2$

$$1) y = 4x^2 - 3$$

$$a = 4$$

skinnier

$$c = -3$$

shift down
3 units

$$2) y = \frac{1}{2}(x - 3)^2 + 4$$

$$a = \frac{1}{2}$$

wider

$$h = 3$$

shifts
right 3 units

$$k = 4 \text{ shifts up } 4$$

Vertex (3, 4)

$$3) y = -5(x + 6)^2 - 7$$

$$a = -5$$

skinnier

reflected
over x-axis

$$h = -6$$

shift
left 6 units

$$k = -7 \text{ shift down}$$

Vertex (-6, -7)

4) Write the equation of a parabola that opens down, is wider, and whose vertex is (-4, 9)

$$y = a(x - h)^2 + k$$

$$y = -\frac{1}{2}(x + 4)^2 + 9$$